

# AFBR-S10RX021Z, AFBR-S10RX031Z



Analog Receiver with Versatile Link Connector  
for Sensing over POF

## Data Sheet



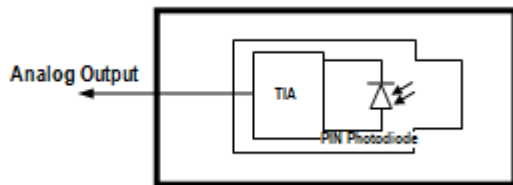
### Description

The Broadcom® AFBR-S10RX0x1Z receiver provides the system designer with the ability to implement an optical arc flash sensor over 1 mm Plastic Optical Fiber (POF). This receiver features a compact Versatile Link connector. In combination with AFBR-15x9Z transmitter, an arc flash sensor system with system self test feature can be realized.

This product is lead free and compliant with RoHS.

### Block Diagram

Figure 1 AFBR-S10RX0x1Z Block Diagram



### Features

- Receiver consisting of a PD and a TIA integrated in a single IC
- High EMI robustness
- Temperature compensated output voltage
- Fast slew rate
- Compact foot print.
- Temperature range -40 °C to 85 °C
- RoHS compliant
- Versatile Link connector system

### Applications

- Arc Flash Detection

### Available Part Numbers

|                    |                |
|--------------------|----------------|
| Horizontal Package | AFBR-S10RX021Z |
| Vertical Package   | AFBR-S10RX031Z |

## Receiver

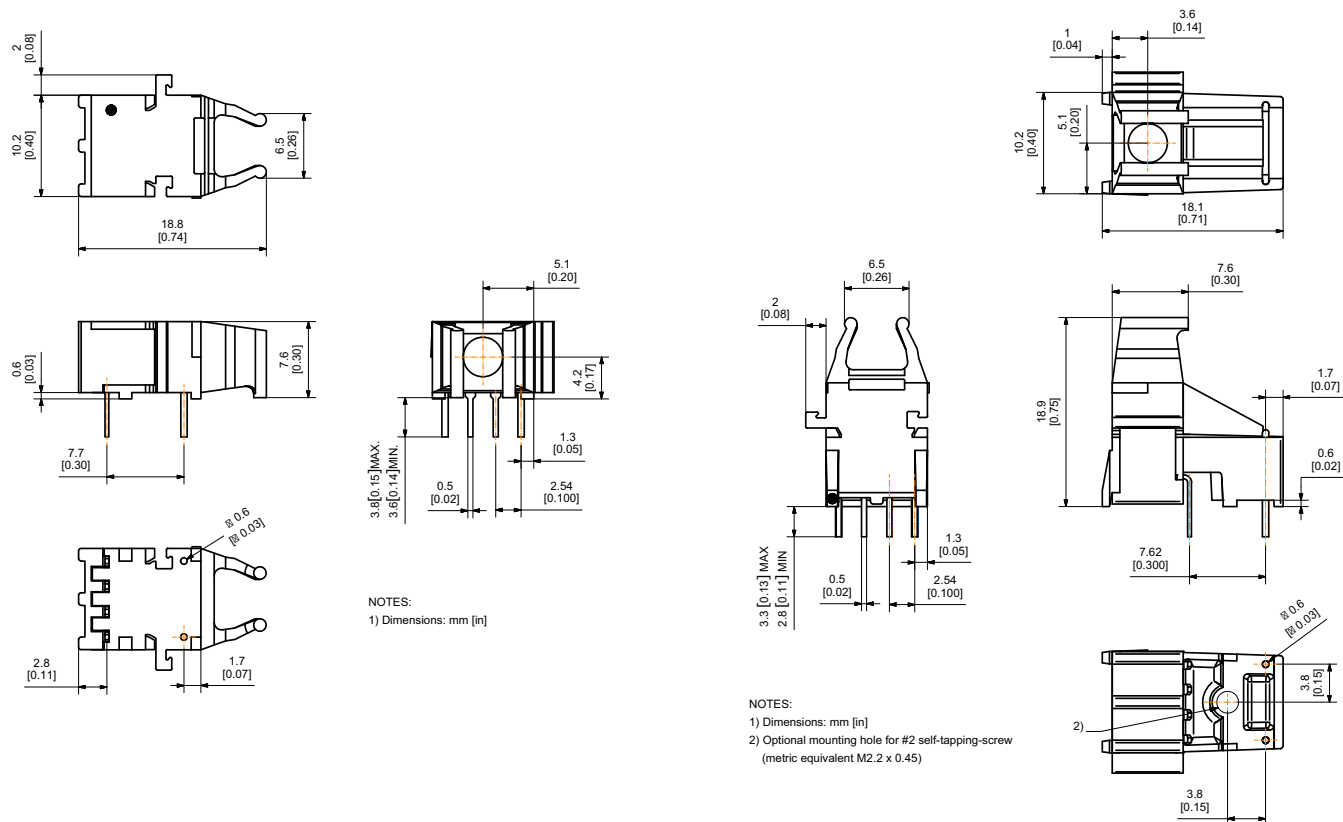
The receiver utilizes an ASIC with integrated photodiode and a linear transimpedance amplifier (TIA). It is packaged into a transfer molded insert, which is furthermore assembled into a Versatile Link plastic housing. This device couples the optical power efficiently from POF fiber to the receiving photodiode. The output voltage is proportional to the coupled input optical power.

## Package and Handling Information

Versatile Link packages are made of a flame-retardant material and use the same pad layout as a standard, eight pin dual-in-line package. Versatile Link packages are stackable and are enclosed to provide a dust-resistant seal. Snap action simplex, simplex latching, duplex, and duplex latching connectors are offered with simplex or duplex cables.

## Mechanical Dimensions

Figure 2 Package Outline Drawing (Horizontal Module, Left, and Vertical Module, Right)



## Package Housing Color

Versatile Link components and simplex connectors are color-coded to eliminate confusion when making connections. Receiver packages are black.

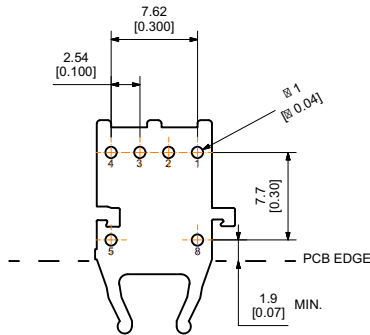
## Handling

Versatile Link components are auto-insertable. When wave soldering is performed with Versatile Link components, the optical port plug should be left in to prevent contamination of the port. Do not use reflow solder processes (i.e., infrared reflow or vapor-phase reflow). Non-halogenated water-soluble fluxes (i.e., 0% chloride), not rosin-based fluxes, are recommended for use with Versatile Link components.

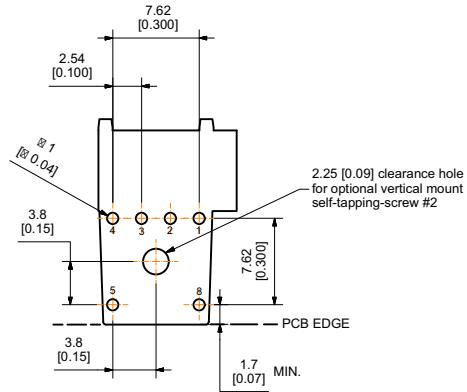
Versatile Link components are moisture-sensitive devices and are shipped in a moisture-sealed bag. If the components are exposed to air for an extended period of time, they may require a baking step before the soldering process. Refer to the special labeling on the shipping tube for details.

## Versatile Link Printed Board Layout Dimensions

Figure 3 PCB Footprint (Horizontal Module, Left, and Vertical Module, Right) – Top View



Dimensions in mm (in.).



Dimensions in mm (in.).

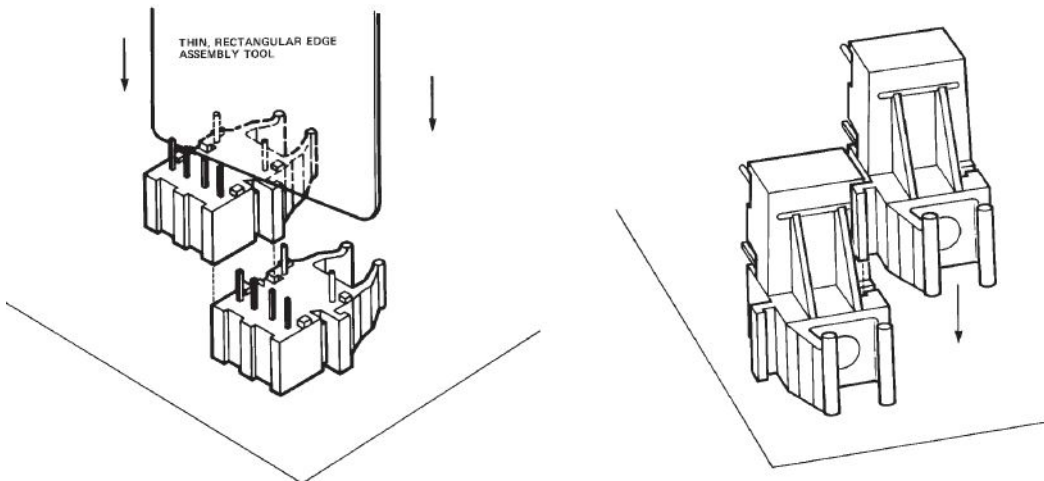
## Interlocked (Stacked) Assemblies

Horizontal packages may be stacked by placing units with pins facing upward. Initially engage the interlocking mechanism by sliding the L bracket body from above into the L slot body of the lower package. Use a straight edge, such as a ruler, to bring all stacked units into uniform alignment. This technique prevents potential harm that could occur to fingers and hands of assemblers from the package pins.

Stacked horizontal packages can be disengaged if necessary. Repeated stacking and unstacking does not cause damage to individual units.

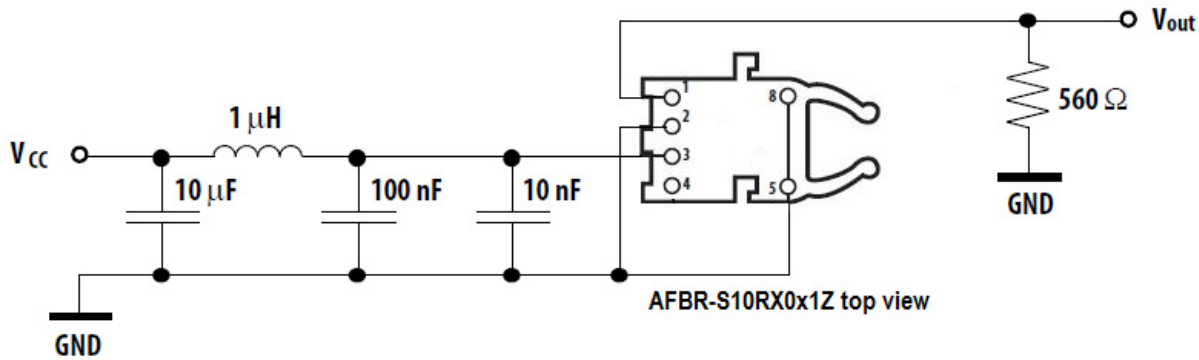
To stack vertical packages, hold one unit in each hand, with the pins facing away and the optical ports on the bottom. Slide the L bracket unit into the L slot unit. The straight edge used for horizontal package alignment is not needed.

Figure 4 Stacking Vertical Modules (Stacking Horizontal Modules, Left, Stacking Vertical Modules, Right)



## Pin Description and Application Circuitry

Figure 5 Recommended Application Circuit



| Pin | Name    | Description                |
|-----|---------|----------------------------|
| 1   | VOUT    | Output Voltage             |
| 2   | GND     | Ground                     |
| 3   | VCC     | Supply Voltage             |
| 4   | N.C.    |                            |
| 5   | Housing | Recommended to chassis GND |
| 8   | Housing | Recommended to chassis GND |

## Regulatory Compliance Table

| Feature  | Test Method                | Performance   |
|--|----------------------------|---|
| Electrostatic discharge (ESD) to the electrical Pins | ESD22-A114                 | Withstands up to 2000V HBM applied between the electrical pins.   |
| Immunity   | Variation of IEC 61000-4-3 | Typically shows no measurable effect from a 15V/m field swept from 8MHz to 1GHz applied to the transceiver when mounted on a circuit board without chassis enclosure. |
| Component recognition                                | Underwriter Laboratories   | UL File #: E173874 (P/N has to be added to UL file)   |

## Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause damage to the device. Limits apply to each parameter in isolation, all other parameters having values within the recommended operation conditions. It should not be assumed that limiting values of more than one parameter can be applied to the products at the same time. Exposure to the absolute maximum ratings for extended periods can adversely affect device reliability.

| Parameter                                      | Symbol     | Min | Max  | Unit | Notes |
|--|------------|-----|------|------|-------|
| Storage and Ambient Temperature                | $T_{S,A}$  | -40 | +85  | °C   | a     |
| Lead Soldering Temperature                     | $T_{sold}$ |     | 260  | °C   | b     |
| Lead Soldering Time                            | $t_{sold}$ |     | 10   | s    | b     |
| Receiver Supply Voltage                        | $V_{CC}$   |     | 6    | V    |       |
| Electrostatic Discharge Voltage Capability HBM | ESD HBM    |     | 2000 | V    | c     |

- a. Operating the product outside the maximum rated temperature range will compromise its reliability and may damage the product.
- b. The receiver is Pb-free wave solderable.
- c. ESD Capability for all Pins HBM(Human Body Model) according JESD22-A114

## Recommended Operating Conditions

| Parameter               | Symbol   | Min  | Typ | Max  | Unit | Notes |
|-------------------------|----------|------|-----|------|------|-------|
| Ambient Temperature     | $T_A$    | -40  |     | +85  | °C   | a     |
| Receiver Supply Voltage | $V_{CC}$ | 4.75 | 5   | 5.25 | V    |       |

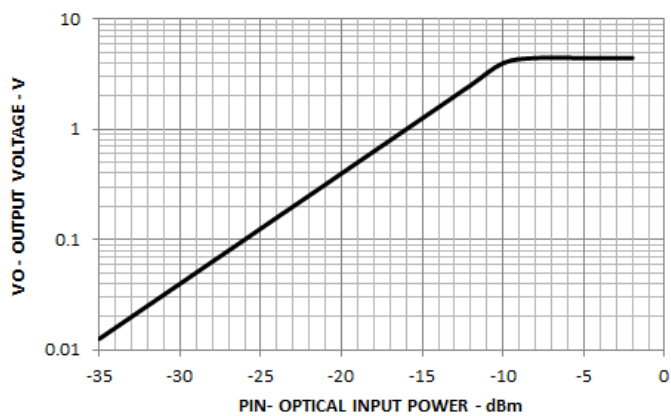
- a. Electrical and optical specifications of the product are guaranteed across recommended ambient operating temperature range unless otherwise specified.

## Electrical and Optical Characteristics

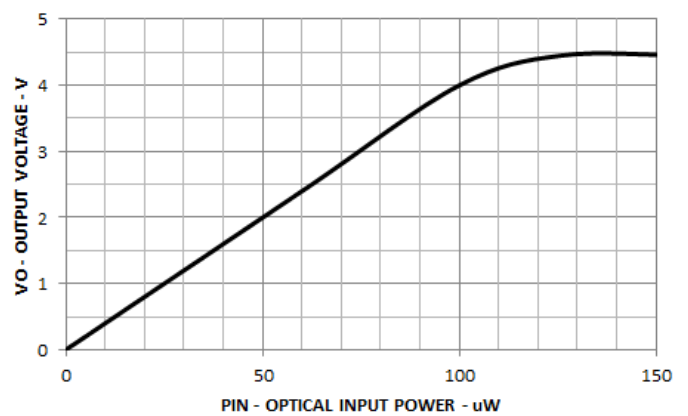
| Parameter                                       | Symbol                    | Min  | Typ | Max  | Unit             | Notes                           |
|---|---------------------------|------|-----|------|------------------|---------------------------------|
| Maximum Photosensitivity Wavelength             | $\lambda_{S\text{MAX}}$   |      | 650 |      | nm               |                                 |
| Photosensitivity Spectral Range                 | $\lambda_{S\text{R}}$     | 300  |     | 1100 | nm               |                                 |
| Responsivity                                    | Resp                      | 25   | 40  | 60   | V/mW             | a, b                            |
| Pulse Output Rise Time (10%–90%)                | $t_{\text{R}}$            |      | 40  |      | ns               | c                               |
| Pulse Output Fall Time (90%–10%)                | $t_{\text{F}}$            |      | 60  |      | ns               | c                               |
| Pulse Width Distortion (in overdrive)           | $\text{PWD}_{\text{OD}}$  |      |     | 1    | $\mu\text{s}$    | d                               |
| Pulse Width Distortion (linear operating range) | $\text{PWD}_{\text{LIN}}$ | -0.5 |     | 0.5  | $\mu\text{s}$    | a, e                            |
| Supply Current                                  | $I_{\text{CC}}$           |      | 7   | 12   | mA               | $I_{\text{out}}=0\text{mA}$     |
| Output Current                                  | $I_{\text{OUT}}$          |      |     | 10   | mA               |                                 |
| Slew Rate                                       | SR                        |      | 75  |      | V/ $\mu\text{s}$ | f                               |
| Output Load Impedance                           | $Z_{\text{L}}$            | 500  |     |      | $\Omega$         | For $V_{\text{CC}}=5.0\text{V}$ |
| Maximum Output Voltage                          | $V_{\text{OMAX}}$         | 4    |     |      | V                |                                 |

- a. Values measured at an optical power of -12 dBm.
- b. Verified at 650 nm.
- c. Measured with 560  $\Omega$  load. For full swing of the output voltage.
- d. Value measured for an optical input pulse of -5 dBm peak, PW = 10  $\mu\text{s}$ , duty cycle = 1/1000. Typically, overdrive condition appears at optical peak input power above -10 dBm.
- e. Optical input pulse PW = 10  $\mu\text{s}$ , duty cycle = 1/1000.
- f.  $R_{\text{L}} = 560 \Omega$ .

**Figure 6 Typical Output Voltage vs. Optical Input Power (Logarithmic Scale)**



**Figure 7 Typical Output Voltage vs. Optical Input Power (Linear Scale)**



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pub-005792 – June 14, 2018



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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

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